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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/035,175	01/04/2002	Shyh-Dar Lee	0941-0392P-SP	2133

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EXAMINER

DEO, DUY VU NGUYEN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 10/10/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/035,175	LEE ET AL.	
	Examiner	Art Unit	
	DuyVu n Deo	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1, 2, 4, 6 are rejected under 35 U.S.C. 102(e) as being anticipated by Yu et al. (US 6,225,171).

Yu describes a method for forming shallow trench isolation comprising steps of: forming a plurality of trenches in the substrate (col. 3, line 10-13; col. 4, line 14-16); forming an oxide liner on the bottom and sidewall of each trench (col. 4, line 30-38); growing a nitrogen doped

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layer on the internal surfaces or sidewalls of the trenches by applying gaseous nitrogen compound at T from approximately 900-100 degree Celsius (claimed thermal annealing in nitrogen-containing atmosphere to dope nitrogen elements in the oxide liner), this would form a nitrogen-rich layer at the interface between the oxide liner and the substrate (col. 3, line 13-15; col. 4, line 40-49).

Referring to claim 2, the nitrogen-containing compound comprises N₂, NH₃, and N₂O (col. 4, line 40-43).

Referring to claim 4, the oxide liner is formed by thermal oxidation (col. 4, line 30-38).

Referring to claim 6, the method further comprising depositing an insulating layer on the entire surface of the substrate to fill the trenches and using CMP to planarize the insulating layer to each to the top of the substrate (col. 4, line 57-63; col. 5, line 4-11).

3. Claims 1, 2, 4-6 are rejected under 35 U.S.C. 102(b) as being anticipated by Gardner et al. (US 5,811,347).

Gardner describes a method for forming shallow trench isolation comprising steps of: forming a plurality of trenches in a substrate (col. 3, line 20-26; col. 5, line 1-5); forming an oxide liner on the bottom and sidewall of the each trench (col. 5, line 38-40, 58-59); implanting the nitrogen into the oxide liner, the sidewalls and trench floor by a rapid thermal anneal (col. 3, line 31-42; col. 5, line 46-50, 60-62). This would read on claimed thermal annealing in a nitrogen-containing atmosphere to dope nitrogen in the oxide liner, wherein a nitrogen-rich layer is formed at the interface between the oxide liner and the substrate.

Referring to claim 2, the nitrogen-containing atmosphere comprises NO, N₂O, NH₃ (col. 3, line 34-35).

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Referring to claim 4, the oxide liner is grown by process such as thermal oxide grown (col. 5, line 43, 44).

Referring to claim 5, the trenches are formed anisotropical dry etch (col. 5, line 31-34)

Referring to claim 6, the method further comprises steps of: depositing an insulating layer on the entire surface of the substrate to fill the trenches and using CMP to planarize the insulating layer to reach the top of the substrate (col. 6, line 7-15, 62-65).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu as applied to claim 1 above, and further in view of Gardner et al. (US 5,811,347).

Unlike claimed invention, Yu doesn't describe the trenches are formed by anisotropic dry etch. Gardner describes the same method of forming STI where he teaches using anisotropic dry etch that is generally well known (col. 5, line 28-34). It would have obvious for one skill in the art to form the trenches in light of Gardner's teaching because Gardner further describes a method that is known to one skill in the art in order to etch the substrate and form trenches for STI with a reasonable expectation of success.

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yu or Gardner as applied to claim 1 above, and further in view of Gilmer et al. (US 5,998, 270).

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Unlike claimed invention, above applied prior art doesn't describe the thermal annealing process is performed at 650-850 degree Celsius, 100-250 mtorr, for 1-30 mins. Gilmer describes a method of incorporating nitrogen into oxide layer w/ a T about 600-950 degree Celsius and about 300 mtorr. He teaches that the processing parameters such as T and P may be suitably selected in consideration of the desired reaction rate and the desired characteristics of the resultant oxynitride layer (col. 3, line 61-col. 4, line 11; col. 4, line 66-col. 5, line 13). It would have been obvious for one skill in the art to determine the processing parameters through routine experimentations, since Gilmer shows that the processing parameters, which would also include processing time, are result-effective variable, in order to obtain optimum processing parameters for the doping of the nitrogen into the substrate with a reasonable expectation of success.

Double Patenting

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1, 2, 4, 6 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 5-10, 14-18 of copending Application No. 10/270,348. Although the conflicting claims are not identical, they

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are not patentably distinct from each other because they describes the same method for forming shallow trench isolation with thermal annealing of the oxide liner.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

9. Claim 3 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 5-10, 14-18 of copending Application No. 10/270,348 in view of Gilmer et al. (US 5,998, 270).

Unlike claimed invention, the claims of application 10/270,348 do not describe the thermal annealing process is performed at 650-850 degree Celsius, 100-250 mtorr, for 1-30 mins. Gilmer describes a method of incorporating nitrogen into oxide layer w/ a T about 600-950 degree Celsius and about 300 mtorr. He teaches that the processing parameters such as T and P may be suitably selected in consideration of the desired reaction rate and the desired characteristics of the resultant oxynitride layer (col. 3, line 61-col. 4, line 11; col. 4, line 66-col. 5, line 13). It would have been obvious for one skill in the art to determine the processing parameters through routine experimentations, since Gilmer shows that the processing parameters, which would also include processing time, are result-effective variable, in order to obtain optimum processing parameters for the doping of the nitrogen into the substrate with a reasonable expectation of success.

This is a provisional obviousness-type double patenting rejection.

10. Claim 5 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 5-10, 14-18 of copending Application No. 10/270,348 in view of Gardner et al. (US 5,811,347).

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Unlike claimed invention, claims of application 10/270,348 do not describe the trenches are formed by anisotropic dry etch. Gardner describes the same method of forming STI where he teaches using anisotropic dry etch that is generally well known (col. 5, line 28-34). It would have obvious for one skill in the art to form the trenches in light of Gardner's teaching because Gardner further describes a method that is known to one skill in the art in order to etch the substrate and form trenches for STI with a reasonable expectation of success.

This is a provisional obviousness-type double patenting rejection.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
9/25/03

NADINE G. NORTON
PRIMARY EXAMINER

